INSTREAM FLOW AND THE IMPORTANCE TO AQUATIC HABITAT

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Abstract

Tennessee Wildlife Resources Agency (TWRA) is establishing an Instream Flow Program as part of the Environmental Services Division.TWRA will conduct Instream Flow studies in two priority watersheds to determine the best Instream Flow Methods for those watersheds. This program will help lay the foundation for future instream flow protection in the state of Tennessee.

Introduction

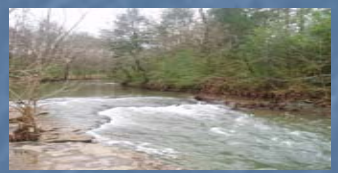
Instream flow is defined as any quantity of water flowing in a natural stream channel at any time of year. Instream flow is more than just water in the stream. It consists of five riverine components which are hydrology, geomorphology, biology, water quality, and connectivity. All of these components are important to research when trying to establish an effective Instream Flow Program. Instream flow must take into account public involvement and the legal/institutional frameworks. Flow affects the life histories of aquatic organisms which in turn affects population numbers and the relative health of the stream. The Tennessee Department of Environment and Conservation monitors water withdrawals where a quantity activity can lead to a quality impact, such as altering of instream flows. Water withdrawals are regulated under the Water Quality Control Act. TWRA wants to develop a standard Instream Flow methodology that can be used to protect streams throughout Tennessee.

Site Description

TWRA has identified two priority watersheds to conduct Instream Flow studies.

Map showing two priority watersheds where instream flow projects will begin in 2007.

Caney Fork Creek, Portland,TN.



West Fork Stones River, Murfreesboro,TN,

Methods

In researching the literature on Instream Flow studies for Tennessee, two methods that have been used are the Indicators of Hydrologic Alteration (IHA) and the Index of Biotic Integrity (IBI). The IBI has been used by TVA in the Tennessee Valley, while the IHA is a new methodology being used on the Harpeth River. TWRA is currently looking at all Instream Flow methods and will test various methods on priority watersheds throughout Tennessee. With the recent emphasis on Instream Flow in the Southeast and the importance of protecting aquatic habitat, it is TWRA's hope that some form of instream flow protection will be adopted for Tennessee.

Instream Flow Assessment Tools. (Annear, et al., 2004)

Hydrology	Biology	Geomorphology	Water Quality	Connectivity
Indicators of Hydrologic Alteration (IHA)	Index of Biotic Integrity (IBI)	Rosgen Geomorphic Stream Classification	September median flow	Floodplain Inundation Method
Compares pre and post-project hydrology	Integrated fish metrics using species and trophic composition and fish abundance and condition	Level 1: describes morphology through channel slope, shape, and pattern	Middle value of September flows	Uses channel and hydraulic variables in floodplain reaches

Steps to Instream Flow Protection (Collaborative effort between United States Geological Survey, Tennessee Wildlife Resources Agency, The Nature Conservancy, and Tennessee Department of Environment and Conservation)

➢ Analyze existing Cumberland and Tennessee River Databases	➢ Principal Components Analysis (PCA)	➢ Technical Advisory Committee (TAC)
· Cumberland/Tennessee Rivers · Digital daily flow records · Fish community metrics, IBI scores, and raw community data	· Correlations between hydrological and ecological datasets	· Committee decides most important ecological functions related to hydrologic characteristics

Anticipated Results

TWRA anticipates developing an Instream Flow Methodology that will lead to a high level of instream flow protection in the State of Tennessee.

Conclusions

- We must understand the interaction between the hydrological and ecological components of rivers.
- Public participation is important in establishing instream flow protection.
- Instream flow methodologies will be tested in Tennessee.
- Tennessee Department of Environment and Conservation (TDEC) monitors water withdrawals in Tennessee where a quantity activity can lead to a quality impact.

References

Annear, Tom, et.al. 2004. Instream Flows for Riverine Resource Stewardship, Revised Edition. Instream Flow Council. BookMasters, Inc.

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